WHAT IS CLAIMED IS:

1. A light-controlled light modulator for modulating, in response to light intensity of first input light with an arbitrary wavelength, second input light with a wavelength identical to or different from a wavelength of the first input light, said light-controlled light modulator comprising;

an optical combiner/splitter for combining the first input signal light and the second input light, and for distributing them to a plurality of ports;

phase modulators, which are connected to the plurality of ports, including media that vary their refractive indices in response to the light intensity of the first input light;

an optical combiner for combining outputs from said phase modulators; and

optical branching-delaying means for branching and delaying the second input light.

2. The light-controlled light modulator as claimed in claim 1, wherein said optical combiner/splitter for combining the first input light and the second input light, and for distributing them to a plurality of ports, said phase modulators, which are connected to the plurality of ports, including media that vary their refractive indices in response to the light

intensity of the first input light, and said optical combiner for combining outputs from said phase modulators constitutes a symmetric Mach-Zehnder optical circuit.

3. The light-controlled light modulator as claimed in claim 2, wherein said optical branching-delaying means comprises a loop-type optical interferometer.

4. The light-controlled light modulator as claimed in claim 3, wherein a length of said media whose refractive indices vary in response to the light intensity of the first input light is shorter than a difference between a first length and a second length, the first length being equal to a length from said branching-delaying means for branching and delaying the second input light to said phase modulators via said optical combiner/splitter that combines the first input light with a first branched part of the second input light and distributes them to the plurality of ports, and the second length being equal to a length from said optical ranching-delaying means to said phase modulators via said optical combiner that combines the outputs from said phase modulators and couples them to a second part of the branched second input light.

5. The light-controlled light modulator as claimed in claim 4, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

6. The light-controlled light modulator as claimed in claim 3, further comprising a plurality of controllers for controlling states of said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

7. The light-controlled light modulator as claimed in claim 6, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

8. The light-controlled light modulator as claimed in claim 3, wherein the media of said phase modulators with the media whose refractive indices vary in response to the light intensity of the first input light have a cross section that varies along a propagation direction of light.

9. The light-controlled light modulator as claimed

in claim 8, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

10. The light-controlled light modulator as claimed in claim 3, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

11. The light-controlled light modulator as claimed in claim 2, wherein said optical branching-delaying means consists of an asymmetric Mach-Zehnder optical circuit.

12. The light-controlled light modulator as claimed in claim 11, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

13. The light-controlled light modulator as claimed in claim 2, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

14. The light-controlled light modulator as claimed in claim 2, further comprising means for controlling the intensity of the input light.

15. The light-controlled light modulator as claimed in claim 14, wherein said means for controlling the intensity of the input light comprises an optical amplifier with a gain control function.

16. The light-controlled light modulator as claimed in claim 1, wherein said optical branching-delaying means comprises a loop-type optical interferometer.

17. The light-controlled light modulator as claimed in claim 16, wherein a length of said media whose refractive indices vary in response to the light intensity of the first input light is shorter than a difference between a first length and a second length, the first length being equal to a length from said branching-delaying means for branching and delaying the second input light to said phase modulators via said optical combiner/splitter that combines the first input light with a first branched part of the second input light and distributes them to the plurality of ports, and the second length being equal to a length from said optical branching-delaying means to said

phase modulators via said optical combiner that combines the outputs from said phase modulators and couples them to a second part of the branched second input light.

18. The light-controlled light modulator as claimed in claim 17, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

19. The light-controlled light modulator as claimed in claim 16, further comprising a plurality of controllers for controlling states of said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

20. The light-controlled light modulator as claimed in claim 19, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

21. The light-controlled light modulator as claimed in claim 16, wherein the media of said phase modulators with the media whose refractive indices

vary in response to the light intensity of the first input light have a cross section that varies along a propagation direction of light.

22. The light-controlled light modulator as claimed in claim 21, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

23. The light-controlled light modulator as claimed in claim 16, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

24. The light-controlled light modulator as claimed in claim 16, further comprising means for controlling the intensity of the input light.

25. The light-controlled light modulator as claimed in claim 24, wherein said means for controlling the intensity of the input light comprises an optical amplifier with a gain control function.

26. The light-controlled light modulator as claimed in claim 1, wherein said optical branching-delaying

means consists of an asymmetric Mach-Zehnder optical circuit.

27. The light-controlled light modulator as claimed in claim 26, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

28. The light-controlled light modulator as claimed in claim 26, further comprising means for controlling the intensity of the input light.

29. The light-controlled light modulator as claimed in claim 28, wherein said means for controlling the intensity of the input light comprises an optical amplifier with a gain control function.

30. The light-controlled light modulator as claimed in claim 1, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

31. The light-controlled light modulator as claimed in claim 30, further comprising means for controlling the intensity of the input light.

32. The light-controlled light modulator as claimed in claim 31, wherein said means for controlling the intensity of the input light comprises an optical amplifier with a gain control function.

33. The light-controlled light modulator as claimed in claim 1, further comprising means for controlling the intensity of the input light.

34. The light-controlled light modulator as claimed in claim 33, wherein said means for controlling the intensity of the input light comprises an optical amplifier with a gain control function.

35. A light-controlled light modulator comprising:

first optical branching means for branching first input light;

optical branching-delaying means for branching and delaying second input light

a first optical combiner/splitter for combining a first branched part of the first input light with a first branched part of the second input light, and for distributing them to a plurality of ports;

phase modulators, which are connected to the plurality of ports, including media that vary their refractive indices in response to light intensity of

the first input light; and

a second optical combiner/splitter for combining outputs from said phase modulators and for branching them to a plurality of parts, and for coupling them with a second branched part of the first input light and a second branched part of the second input light.

36. The light-controlled light modulator as claimed in claim 35, wherein said first optical combiner/splitter for combining the first input light and the second input light, and for distributing them to the plurality of ports, said phase modulators, which are connected to the plurality of ports, including media that vary their refractive indices in response to the light intensity of the first input light, and said second optical combiner/splitter for combining outputs from said phase modulators constitute a symmetric Mach-Zehnder optical circuit.

37. The light-controlled light modulator as claimed in claim 36, wherein said optical branching-delaying means comprises a loop-type optical interferometer.

38. The light-controlled light modulator as claimed in claim 37, wherein a length of said media whose refractive indices vary in response to the light intensity of the first input light is shorter than a

difference between a first length and a second length, the first length being equal to a length from said branching-delaying means for branching and delaying the second input light to said phase modulators via said optical combiner/splitter that combines the first input light with a first branched part of the second input light and distributes them to the plurality of ports, and the second length being equal to a length from said branching-delaying means to said phase modulators via said optical combiner that combines the outputs from said phase modulators and couples them to a second part of the branched second input light.

39. The light-controlled light modulator as claimed in claim 38, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

40. The light-controlled light modulator as claimed in claim 37, further comprising a plurality of controllers for controlling states of said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

41. The light-controlled light modulator as claimed

in claim 40, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

42. The light-controlled light modulator as claimed in claim 37, wherein the media of said phase modulators with the media whose refractive indices vary in response to the light intensity of the first input light have a cross section that varies along a propagation direction of light.

43. The light-controlled light modulator as claimed in claim 42, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

44. The light-controlled light modulator as claimed in claim 37, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

45. The light-controlled light modulator as claimed in claim 36, wherein semiconductor optical amplifiers are used as said phase modulators including the media

whose refractive indices vary in response to the light intensity of the first input light.

46. The light-controlled light modulator as claimed in claim 36, further comprising means for controlling the intensity of the input light.

47. The light-controlled light modulator as claimed in claim 46, wherein said means for controlling the intensity of the input light comprises an optical amplifier with a gain control function.

48. The light-controlled light modulator as claimed in claim 35, wherein said optical branching-delaying means comprises a loop-type optical interferometer.

49. The light-controlled light modulator as claimed in claim 48, wherein a length of said media whose refractive indices vary in response to the light intensity of the first input light is shorter than a difference between a first length and a second length, the first length being equal to a length from said branching-delaying means for branching and delaying the second input light to said phase modulators via said optical combiner/splitter that combines the first input light with a first branched part of the second input light and distributes them to the plurality of

ports, and the second length being equal to a length from said branching-delaying means to said phase modulators via said optical combiner that combines the outputs from said phase modulators and couples them to a second part of the branched second input light.

50. The light-controlled light modulator as claimed in claim 49, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

51. The light-controlled light modulator as claimed in claim 48, further comprising a plurality of controllers for controlling states of said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

52. The light-controlled light modulator as claimed in claim 51, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

53. The light-controlled light modulator as claimed in claim 48, wherein the media of said phase

modulators with the media whose refractive indices vary in response to the light intensity of the first input light have a cross section that varies along a propagation direction of light.

54. The light-controlled light modulator as claimed in claim 53, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

55. The light-controlled light modulator as claimed in claim 48, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

56. The light-controlled light modulator as claimed in claim 48, further comprising means for controlling the intensity of the input light.

57. The light-controlled light modulator as claimed in claim 56, wherein said means for controlling the intensity of the input light comprises an optical amplifier with a gain control function.

58. The light-controlled light modulator as claimed

in claim 35, wherein semiconductor optical amplifiers are used as said phase modulators including the media whose refractive indices vary in response to the light intensity of the first input light.

59. The light-controlled light modulator as claimed in claim 58, further comprising means for controlling the intensity of the input light.

60. The light-controlled light modulator as claimed in claim 59, wherein said means for controlling the intensity of the input light comprises an optical amplifier with a gain control function.

61. The light-controlled light modulator as claimed in claim 35, further comprising means for controlling the intensity of the input light.

62. The light-controlled light modulator as claimed in claim 61, wherein said means for controlling the intensity of the input light comprises an optical amplifier with a gain control function.